THE USE OF ^{90}Sr/^{90}Y GENERATOR FOR ELECTROCHEMICAL SEPARATION OF ^{90}Y FROM ^{90}Sr

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^{90}Y is a radioisotope and decay product of ^{90}Sr for therapeutic purpose due to its suitable half-life $T_{1/2}$=64.1h. The half-life of ^{90}Sr is longer ($T_{1/2}$=28,9 years) and have a high skeleton uptake.
To obtain a radionuclide with a high level of purity is necessary to separate ^{90}Y from the bulk of ^{90}Sr. The most promising approach to separate ^{90}Y from the bulk of ^{90}Sr is using the electrochemical ^{90}Sr/^{90}Y generator.

The separation is based on the selective deposition of ^{90}Y on a platinum electrode. This is attributed to the difference in electrode potential of Sr^{2+} and Y^{3+} ions in acidic media.

$$Sr^{2+} + 2e \rightarrow Sr \quad E^o = -2.89\ V$$
$$Y^{3+} + 3e \rightarrow Y \quad E^o = -2.27\ V$$

Electrochemical separation involved two electrolysis cycles:

separation of ^{90}Y from ^{90}Sr

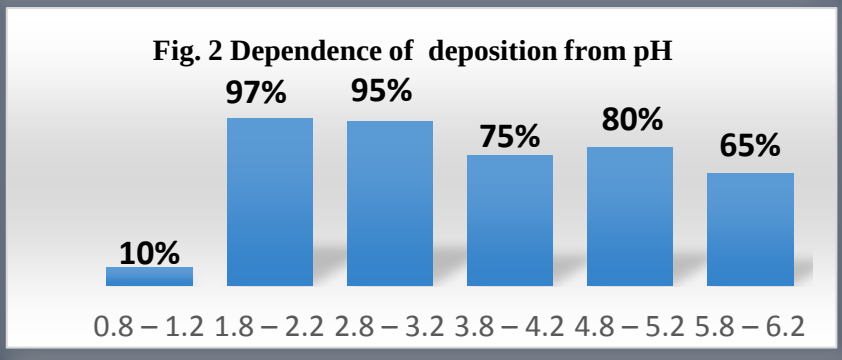
(platinum electrodes like anode and cathode. Selective electrochemical deposition of ^{90}Y on platinum electrode at pH 2-3, potential -2.5V)

purification of ^{90}Y

(anode is the cathode from the first cycle and cathode is circular platinum electrode. ^{90}Y was deposited on circular platinum cathode at pH 2-3, potential -2.5V

Fig. 1 ^{90}Sr/^{90}Y generator

Optimization of the parameters of electrolysis for the separation of ^{90}Y from ^{90}Sr:
maximum deposition at -2.5V (Table 1) and pH 2.5–3.0 (Fig. 2)



Applied potential (V)	Electrodeposition of ^{90}Y (%)
-1.0	4±2
-1.5	53±3
-2.0	80±3
-2.5	97±2
-3.0	>99 co-deposition of ^{90}Sr at this voltage.

Table. 1 Dependence of deposition from potential

Conslusion

Electrochemical separation of ^{90}Y from ^{90}Sr with ^{90}Sr/^{90}Y generator is of high importance for radiopharmacy and for obtaining a pure ^{90}Y, who can be used for radiolabeling of various targeting molecules for the treatment of cancer.